North American Bullfrog *Rana catesbeiana*

Ecology: North American bullfrogs are the largest true frog found in North America, weighing up to 0.5 kg and reaching 203 mm in length. Typical lengths range from 90 to 152 mm. Color varies from brownish to shades of green, often with spots or blotches of a darker color about the back. The hind feet are fully webbed. The sex of an adult bullfrog can be easily determined by examining the size of the tympanum (the external ear of the frog) relative to that of the eye: in males the tympanum is much larger than the eye; in females the tympanum is equal to or smaller than the eye. Also, during the breeding season the throat of the male bullfrog is yellow, whereas the female's is white (Bruening 2002). North American bullfrogs are only native to the Nearctic region. They are found from Nova Scotia to central Florida, from the East coast to Wisconsin, and across the Great Plains to the Rockies. The natural western limits of this species are now confused due to their introduction into places as far west as California and Mexico. It is known that bullfrogs were introduced to areas of California and Colorado in the early 1900's. The species has also been introduced (accidentally or on purpose) into southern Europe, South America and Asia (Bruening 2002).

Breeding takes place in May to July in the north, and from February to October in the south; Utah would be considered part of its northern breeding range. Fertilization is external, with the females depositing as many as 20,000 eggs in a foamy film in quiet, protected waters. Fertilization is usually, but not always, by one male. Tadpoles emerge about four days after fertilization. These tadpoles may remain in the tadpole stage for almost 3 years before transforming into frogs. Adults reach sexual maturity after 3 to 5 years. The average bullfrog lives seven to nine years in the wild. The record lifespan of an animal in captivity is 16 years (Bruening 2002).

North American bullfrogs prefer warm weather and will hibernate during cold weather. A bullfrog may bury itself in mud and construct a small cave-like structure for the winter. Bullfrogs are active both during the day and at night (Govindarajulu 2000).
Bullfrogs are very aggressive predators. They eat snakes, worms, insects, mice, crustaceans, frogs, tadpoles, and aquatic eggs of fish, frogs, insects, or salamanders. There have also been a few cases reported of bullfrogs eating bats, and turtles. They are also cannibalistic and will not hesitate to eat their own kind. Bullfrog tadpoles mostly graze on aquatic plants (Bruening 2002; Hedrick 2008).

Humans hunt bullfrogs, since their legs are considered a tasty meal, but there is a limited hunting season in most states. In Utah a fishing license is required to hunt bullfrog, but there is no season and no limit. Bullfrogs are also eaten by a wide variety of other animals including: herons, such as great blue herons and great egrets; turtles; water snakes; raccoons; and belted kingfishers (Bruening 2002).

Distribution: Bullfrogs were introduced into the west (California and Colorado) in the early 1900's and since then they have been introduced into Southern Europe, South America and Asia (Bruening 2002). It is unknown when they first arrived in Utah, but a breeding population has existed along the Colorado River, in the Moab marsh, since the early 1970s (Pers. Comm. Larry Dalton. 2008. Aquatic Invasive Species Coordinator,

Utah Division of Wildlife Resources). Today, bullfrog populations persist in many areas of Utah (Pers. Comm. Krissy Wilson. 2008. Native Aquatic Species Program Coordinator, Utah Division of Wildlife Resources).

Pathways to Introduction: In Utah, especially along the Wasatch Front, plant nurseries were known to give away bullfrogs with the purchase of backyard water features. Also, teachers were receiving bullfrog tadpoles in educational activity kits, and then allowing children to take the frogs home, when the lesson was completed. The bullfrogs were then released into the wild, once the children and their families tired of the hobby (Pers. Comm. Diana Vos. 2008. Project WILD Coordinator, Utah Division of Wildlife Resources). Bullfrogs have also been accidentally introduced during trout stocking, through the aquarium trade, and for sport and pest control (USDA 2008).

Management Considerations: Strategies to control negative impacts from bullfrogs vary from state to state. A recommended technique for control in stock water ponds is draining them entirely while at the same time shooting adults as they attempt to escape (Doubledee et al. 2003). Arizona has employed this technique in numerous isolated areas around the state to benefit various sport fisheries (Pers. Comm. Trina Hedrick. 2008. Utah Division of Wildlife Resources Northeastern Region Aquatic Native Species Biologist). Colorado allows unlimited statewide harvest of bullfrogs, which can legally be taken by archery, gig, dip net, or by hand. Members of the public still continue to move bullfrogs around in British Columbia, so they have implemented an extensive public education program to increase people's knowledge of the harm that bullfrogs do to native ecosystems. Govindarajulu (2004) stated, in his review of bullfrog populations in British Columbia, that complete eradication is only feasible in small, isolated areas. However, he does recommend culling metamorphs in the early fall as a method to control their populations vs. removal of adults, which tends to increase populations due to decreased cannibalism (Govindarajulu et al. 2005).

Likely, filtering off metamorphs and physically killing adults bullfrogs is the only method for control during a translocation of fish stocks.

Biologists with the Utah Division of Wildlife Resources have worked with nurseries to discontinue giving away bullfrogs. Utah Division of Wildlife Resources has also contacted educational companies distributing frogs in educational kits. Educators in Utah will no longer receive bullfrogs if they order from these companies; however, educators in neighboring states can still receive frogs with their order (Pers. Comm. Trina Hedrick. 2008. Utah Division of Wildlife Resources Northeastern Region Aquatic Native Species Biologist; Pers. Comm. Diana Vos. 2008. Project WILD Coordinator, Utah Division of Wildlife Resources).

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American Bullfrog

(RANA CATESBEIANA)

Current Distribution